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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/747,678
Filing Date: December 22, 2000
Appellant(s): KEHRLE ET AL.

R. Ross Viguet
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/5/2006 appealing from the Office action mailed 9/19/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,104,403	Mukouchi et al	8-2000
6,341,291	Bentley et al	1-2002

5,594,850 Noyama et al 1-1997

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

a. Claims 11-15, 21-24 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mukouchi et al. (6,104,403).

As per claim 11, Mukouchi et al., hereinafter Mukouchi discloses a method of manipulating computer aided design (CAD) objects, comprising:

receiving user input to associate two CAD objects, wherein said user input identifies a coupling between said two CAD objects selected from a group of connections consisting of: a vertex-to-vertex connection, an axis-to-axis connection, an edge-to-axis connection, and a face-to-face connection (Figure 21 where 114 is a door and 112 is a door frame; the connection between the two is an edge-to-edge connection);

displaying said two CAD objects according to the coupling identified by the user input (Figure 22 where the hinge unit of the door frame model with the reference points 116 and 118 are identified as the coupling);

calculating a reduction in degrees of freedom between said two CAD objects caused by said identified coupling calculating and providing on the screen an indication of a remaining degrees of freedom of the components after the change has been made (Figure 19 depicts the calculation steps; Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data", column 6, line 11-13; "FIG. 24 illustrates an assembly model appearing after attaching the door part model 114 to the door frame part model 112 at the two

junction reference points", column 15, line 33-35. Since the door is hinged after movements, it shows lesser degree of freedom of movement. Since Mukouchi teaches the movement of the model (Figure 19- S1-S7), and the movement shows the degree of freedom (Figure 22 and 24 which shows that after the reference points 116 and 118 are hinged, the movement of the door is restricted to an angular movement and no other possible movement is indicated), it is inherent that Mukouchi is calculating for the movement of the object and the degree of freedom); and

displaying an indication of said reduction in said degrees of freedom in association with the display of said two CAD objects (Figure 24 displays reduction of freedom after connection where the arrow and dash lines are the indications showing the restricted movement after the edges are connected).

Mukouchi teaches assembling 3D object model. It is noted that Mukouchi does not explicitly mention his Figure 24 is used for a CAD system. However, since Mukouchi teaches his objects are created using CAD technique (Figure 7, line 52), it would have been obvious to one of ordinary skill in the art to apply it to a CAD system in order to exemplify a possible movement of an object.

b. As per claim 12, Mukouchi demonstrated all the elements as disclosed in the rejected claim 11, and further discloses at least one of said two CAD objects comprises a group of subcomponents (Figure 50 where each CAD object is a complex object with a pluralities of sub-components).

c. As per claim 13, Mukouchi demonstrated all the elements as disclosed in the rejected claim 11, and further discloses:

verifying that said identified coupling is consistent with a prior coupling between said two CAD objects before performing said displaying said two CAD objects ("In case of the mode 2 assembling process, as in Fig. 15 for instance, the movements of the assembling part models are **checked** in the state where the basic part model 64 which is the assembling object and the part models 66 and 68 to be assembled are arranged in the world coordinate space", column 14, line 41- column 15, line 9, where checking the state is a verifying process).

d. As per claim 14, Mukouchi demonstrated all the elements as disclosed in the rejected claim 11, and further discloses:

receiving user input to position said two CAD objects relative to each other before receiving said user input that identifies a coupling between said two CAD objects ("Figure 10A and 10B illustrate another embodiment of processing for assembling together part models having one point junction reference data. Fig. 10A shows the preassembling state in which the part models 30 and 46 are arranged in the world coordinate space, with the part models 30 and 46 having junction reference points 32 and 48 set in there respective intra-model units ...", column 11, line 51-64); and

displaying said two CAD objects according to relative positioning (Figure 10B).

e. As per claim 15, Mukouchi demonstrated all the elements as disclosed in the rejected claim 14, and further discloses:

calculating a reduction in degrees of freedom caused by said relative positioning of said two CAD objects (Figure 19 depicts the calculation steps; Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having

two points junction reference data", column 6, line 11-13; "FIG. 24 illustrates an assembly model appearing after attaching the door part model 114 to the door frame part model 112 at the two junction reference points", column 15, line 33-35. Since the door is hinged after movements, it shows lesser degree of freedom of movement. Before the door is hinged, the door is moveable in both lateral and angular direction; afterward, the door is moveable only in angular direction, therefore, it is lesser degree of freedom); and

displaying said reduction in degrees of freedom in association with display of said two CAD objects (displaying an indication of said reduction in said degrees of freedom in association with the display of said two CAD objects (Figure 24 displays reduction of freedom after connection).

f. As per claim 21, Mukouchi discloses a computer aided design (CAD) system, comprising:

means for defining a virtual environment in which CAD objects are manipulated (Figure 1 is the means and Figure 21 is a virtual environment);

and since the rest of the limitations are similar to claim 11, they are similarly rejected as in claim 11.

g. As per claim 22, since the claim limitation is similar to claim 12, it is similarly rejected as claim 12.

h. As claim 23, since the claim limitation is similar to claim 13, it is similarly rejected as claim 13.

i. As claim 24, since the claim limitation is similar to claim 14, it is similarly rejected as claim 14.

j. As per claim 26, Mukouchi discloses a method, comprising:

providing a virtual environment in which computer aided design (CAD) objects are manipulated (Figure 21 is a virtual environment);

and since the rest of the limitations are similar to claim 11, they are similarly rejected as in claim 11.

k. As per claim 27, since the claim limitation is similar to claim 12, it is similarly rejected as claim 12.

l. As per 28, since the claim limitation is similar to claim 13, it is similarly rejected as claim 13.

m. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mukouchi et al. as applied to claim 11 above, and further in view of Bentley et al. (6,341,291).

n. As per claim 16, Mukouchi demonstrated all the elements as disclosed in the rejected claim 11.

Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model. It is noted that Mukouchi does not explicitly disclose "said receiving, displaying said two CAD objects, calculating, and displaying an indication are performed by a collaborative design application associated with a plurality of users", however, this is known in the art as taught by Bentley. Bentley discloses a computer network used in CAD design where a central server is used ("A plurality of

client computers are bi-directionally connected to the server", Abstract, line 8-9; see also title "System for **collaborative** engineering using component and file-oriented tools").

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses the CAD data be shared in a network environment in order to be used by a plurality of users.

o. As per claim 17, Mukouchi and Bentley demonstrated all the elements as disclosed in the rejected claim 16, and Bentley further discloses maintains a virtual model including said two CAD objects, and wherein said displaying said two CAD objects and displaying said indication are performed by communicating only changes in said virtual model caused by said identified coupling ("Each client computer may obtain the current version of the components and may send locally edited versions of the components back to the server to replace the current versions in the repository", Abstract line 9-13, where the locally edited version is considered a portion of the original image).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses the CAD data be shared in a network environment in order to be used by a plurality of users.

p. As per claim 18, Mukouchi and Bentley demonstrated all the elements as disclosed in the rejected claim 16, and Bentley further discloses:

locking one of said two CAD objects in response to user input from a respective user, prior to receiving user input to associate two CAD objects, to prevent other users from manipulating said locked CAD object ("If there are unresolved conflicts, that is, components that have been modified and committed by another user and have also been changed locally, then commit is blocked", column 13, line 8-11, where blocked commit is considered locking ... to prevent).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses usage by other user can be blocked in order to avoid conflict.

q. As per claim 19, Mukouchi and Bentley demonstrated all the elements as disclosed in the rejected claim 16.

As for unlocking said one of said two CAD objects after displaying said two CAD objects according to the identified coupling, since the lock signal is established to prevent changes by other, it is obvious the lock signal is removed after change has been made in order to prevent hanging of the system.

r. Claims 20 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Mukouchi as applied to claim 11 above, and further in view of Noyama (5,594,850).

s. As per claim 20, Mukouchi demonstrated all the elements as disclosed in the rejected claim 11.

Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model. It is noted that Mukouchi does not explicitly disclose wherein said displaying said two CAD objects comprises: applying a transformation matrix to at least one of said two CAD objects, however, this is known in the art as taught by Noyama et al., hereafter Noyama. Noyama discloses a method of simulating images in which a transformation matrix is calculated between a source image and a destination image (204-208 of Figure 11).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Noyama into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Noyama discloses a transformation matrix between two images can be calculated in order to facilitate the transformation.

t. As claim 25, since the claim limitation is similar to claim 20, it is similarly rejected as claim 20.

(10) Response to Argument

As per claims 11, 12 and 4, Appellant alleges Mukouchi does not teach "calculating a reduction in degrees of freedom between said two CAD objects caused by said identified coupling". In reply, Examiner contend that Mukouchi discloses a CAD system (column 7, line 2) that creates and assembles object models. Since a CAD system is a computer system, it is inherent that a CAD requires software to calculate the

movements and placements of the objects. (Figure 53 illustrates a CAD system where program is provided to run the system.) As for the degrees of freedom, it is dependent on the allowable translational and rotational movement of a body. Mukouchi shows in Figure 24 an assembling process that when a door is hinged, its movement is restricted to a rotational movement. ("By virtue of the junction based on the two points consisting of the junction reference points 116 and 118, there will not be restricted any rotation around an axis which is a line joining the two points 116 and 118. This will enable a door hinge or the like to be represented, achieving such display processing as to allow the door part model 114 to turn for opening or closing around the axis which is the line joining the two junction reference points 116 and 118" (column 15, line 34-43). Although the door is freely to move in the rotational direction around the axis joining the hinges, its translational movement is restricted; thus, its degree of freedom is reduced.

Appellant alleges Mukouchi does not teach "displaying an indication of said reduction in said degrees of freedom in association with the display of said two CAD objects". In reply, Examiner contend that appellant's disclosure refers to Figures 4-11 to show various visual feedback and remaining degrees of freedom. These figures are similar to Mukouchi's figures. Mukouchi discloses an assembling process and a representation method as shown in Figure 24 (where the arrow and hinges show the restriction of movements, therefore, reduced degrees of freedom) and restriction of movement when the door object is hinged (column 15, line 34-43), and since Mukouchi's invention is toward a CAD system, it would have been obvious to one of

ordinary skill in the art at the time of invention was made to consider such displaying method in order to represent CAD objects.

Appellant alleges Mukouchi's Figure 24 does not show a reduction in the degrees of freedom. In reply, Examiner contend that since the claim limitation does not require any additional indicator to indicate a reduction of degrees of freedom, by having Mukouchi showing only a rotational movement could be performed to the door (because the arrow and hinges show the restriction of movements), degrees of freedom is reduced (by restricting translational movements). Also, "Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data" (see column 6, line 11-13).

As per claim 13, appellant alleges Mukouchi does not teach "verifying that said identified coupling is consistent with a prior coupling between said two CAD objects before performing said displaying said two CAD objects". In reply, Examiner contend that "In case of the mode 2 assembling process, as in Fig. 15 for instance, the movements of the assembling part models are **checked** in the state where the basic part model 64 which is the assembling object and the part models 66 and 68 to be assembled are arranged in the world coordinate space" (column 14, line 41- column 15, line 9), where checking before movement is a verifying process before coupling.

As per claim 15, appellant alleges Mukouchi does not teach "calculating a reduction in degrees of freedom caused by said relative positioning of said two CAD objects". In reply, Examiner contend that Mukouchi discloses the calculation steps in Figure 19, and "Figure 24 is an explanatory diagram of the degree of freedom between

assembling part models having two points junction reference data" (column 6, line 11-13); "FIG. 24 illustrates an assembly model appearing after attaching the door part model 114 to the door frame part model 112 at the two junction reference points" (column 15, line 33-35). Since the door is hinged after movements, it shows lesser degree of freedom of movement. Before the door is hinged, the door is moveable in both lateral and angular direction; afterward, the door is moveable only in angular direction, therefore, it has lesser degree of freedom.

As per claims 21, 22 and 24, appellant alleges Mukouchi doe not teach "determining a reduction in degrees of freedom caused by said identifying coupling". In reply, Examiner contend that "Figure 22 is an explanatory diagram of assembling processing of the part model having two points junction reference data" (column 6, line 6-8) and "Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data" (see column 6, line 11-13); from the assembling processing in Figure 22 to the explanatory diagram, a reduction in degrees of freedom is determined". Appellant alleges Mukouchi fails to teach any restriction in the rotational movement, therefore cannot teach determining reduction in degrees of freedom. It is reminded that degrees of freedom includes translational movement and rotational movement.

Appellant alleges Mukouchi does not teach "displaying an indication of degrees of freedom associated with said two CAD objects after application of said identified coupling". In reply, Examiner contend Mukouchi discloses an assembling process and a representation method after application of an identified coupling as shown in Figure 24

(where the arrow and hinges show the restriction of movements, therefore, reduced degrees of freedom). "Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data" (column 6, line 11-13); Figure 24 shows a restriction of movement when the door object is hinged (coupled) (column 15, line 34-43). Since Mukouchi's invention is toward a CAD system, it would have been obvious to one of ordinary skill in the art at the time of invention was made to consider such displaying method in order to represent CAD objects.

As per claim 23, appellant alleges Mukouchi does not teach "determining whether said identified coupling is consistent with a prior coupling applied to one of said two CAD objects". In reply, Examiner contend that "In case of the mode 2 assembling process, as in Fig. 15 for instance, the movements of the assembling part models are **checked** in the state where the basic part model 64 which is the assembling object and the part models 66 and 68 to be assembled are arranged in the world coordinate space" (column 14, line 41- column 15, line 9), where checking before movement is a verifying process before coupling.

As per claims 26-28, appellant alleges Mukouchi doe not teach "determining a reduction in degrees of freedom caused by said identifying coupling". In reply, Examiner contend that "Figure 22 is an explanatory diagram of assembling processing of the part model having two points junction reference data" (column 6, line 6-8) and "Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data" (see column 6, line 11-13); from the assembling processing in Figure 22 to the explanatory diagram, a reduction in degrees

of freedom is determined". Appellant alleges Mukouchi fails to teach any restriction in the rotational movement, therefore cannot teach determining reduction in degrees of freedom. It is reminded that degrees of freedom includes translational movement and rotational movement.

Appellant alleges Mukouchi does not teach "displaying an indication of degrees of freedom associated with said two CAD objects after application of said identified coupling". In reply, Examiner contend that Mukouchi discloses an assembling process and a representation method after application of an identified coupling as shown in Figure 24 (where the arrow and hinges show the restriction of movements, therefore, reduced degrees of freedom). "Figure 24 is an explanatory diagram of the degree of freedom between assembling part models having two points junction reference data" (column 6, line 11-13); Figure 24 shows a restriction of movement when the door object is hinged (coupled) after assembly (column 15, line 34-43). Since Mukouchi's invention is toward a CAD system, it would have been obvious to one of ordinary skill in the art at the time of invention was made to consider such displaying method in order to represent CAD objects.

As per claim 28, appellant alleges Mukouchi does not teach "determining whether said coupling identified by said user is consistent with prior couplings applied to one of said two CAD objects". In reply, Examiner contend that Mukouchi discloses "In case of the mode 2 assembling process, as in Fig. 15 for instance, the movements of the assembling part models are **checked** in the state where the basic part model 64 which is the assembling object and the part models 66 and 68 to be assembled are

arranged in the world coordinate space" (column 14, line 41- column 15, line 9), where checking before movement is a verifying process before coupling.

As per claim 16, appellant alleges Examiner does not provide a motivation to combine Bentley with Mukouchi. In reply, Examiner contend that Mukouchi disclose a CAD system; although Mukouchi does not explicitly disclose "said receiving, displaying said two CAD objects, calculating, and displaying an indication are performed by a collaborative design application associated with a plurality of users", however, this is known in the art as taught by Bentley. Bentley discloses a computer network used in CAD design where a central server is used ("A plurality of client computers are bi-directionally connected to the server", Abstract, line 8-9; see also title "System for **collaborative** engineering using component and file-oriented tools").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses the CAD data be shared in a network environment in order to be used by a plurality of users, wherein the motivation to combine Bentley with Mukouchi is to share the CAD data with a plurality of users.

As per claim 17, appellant alleges Bentley does not teach "displaying said two CAD objects and displaying said indication are performed by communicating only changes in said virtual model caused by said identified coupling", and Examiner has not provided a motivation to combine Bentley with Mukouchi. In reply, Examiner contend that Mukouchi disclose a CAD system; although Mukouchi does not explicitly disclose

above mentioned limitation, however, this is known in the art as taught by Bentley. Bentley discloses "Each client computer may obtain the current version of the components and may send locally edited versions of the components back to the server to replace the current versions in the repository" (Abstract line 9-13), where the locally edited version of the components are considered portions of the original image.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses the CAD data be shared in a network environment in order to be used by a plurality of users, wherein the motivation to combine Bentley with Mukouchi is to share the CAD data with a plurality of users.

As per claim 18, appellant alleges Bentley does not teach "locking one of said two CAD objects in response to user input from a respective user, prior to receiving user input to associate two CAD objects, to prevent other users from manipulating said locked CAD object" and Examiner has not provided a motivation to combine Bentley with Mukouchi. In reply, Examiner contend that Mukouchi disclose a CAD system; although Mukouchi does not explicitly disclose above mentioned limitation, however, this is known in the art as taught by Bentley. Bentley discloses "If there are unresolved conflicts, that is, components that have been modified and committed by another user and have also been changed locally, then commit is blocked" (column 13, line 8-11), where blocked commit is considered locking ... to prevent, and it would prevent further user input to associate two CAD objects..

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bentley into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Bentley discloses usage by other user can be blocked in order to avoid conflict in a multiple user environment.

As per claim 19, appellant alleges Bentley does not teach "unlocking said one of said two CAD objects after displaying said two CAD objects according to the identified coupling". In reply, Examiner contend that since the lock signal is established to prevent changes by other, it is obvious the lock signal is removed in order to prevent hanging of the system.

As per claim 20, appellant alleges neither Mukouchi nor Noyama teaches applying a transformation matrix to at least one of said two CAD objects. In reply, Examiner contend this is known in the art as taught by Noyama. Noyama discloses a method of simulating images in which a transformation matrix is calculated between a source image and a destination image (204-208 of Figure 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Noyama into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Noyama discloses a transformation matrix between two images can be calculated in order to facilitate the transformation, where using a transformation matrix is a quick and easy way to transform an image.

As per claim 25, appellant alleges neither Mukouchi nor Noyama teaches means for applying transformation matrix operations to CAD objects that correspond to user manipulations of said CAD objects. In reply, Examiner contend this is known in the art as taught by Noyama. Noyama discloses a method of simulating images in which a transformation matrix is calculated between a source image and a destination image (204-208 of Figure 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Noyama into Mukouchi because Mukouchi discloses a method of changing the relative position and/or orientation of two components of a virtual model and Noyama discloses a transformation matrix between two images can be calculated in order to facilitate the transformation, where using a transformation matrix is a quick and easy way to transform an image.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Ryan Yang

Ryan Yang

Conferees:

Mark Zimmerman, SPE AU 2628

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